UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/450,514	11/30/1999	KOICHI SATO	P18408	7714

7055 7590 12/08/2006

GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

EXAMINER	
HANNETT, JAMES M	
ART UNIT	**PAPER NUMBER**
2622	

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/450,514	SATO, KOICHI	
	Examiner	**Art Unit**	
	James M. Hannett	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/14/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 November 1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/14/2006 has been entered.

Response to Arguments

Applicant's arguments with respect to claims 1 and 3-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1: Claims 1, 3-9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,593,965 Miyamoto in view of in view of USPN 5,912,708 Kondo et al in further view of USPN 5,900,623 Tsang in view of USPN 5,734,427 Hayashi et al in further view of USPN 4,779,135 Judd.

2: As for Claim 1, Miyamoto teaches an image reading device comprising:

An imaging device that has pixels and color filters provided on said imaging device, said color filter having color filter elements of a plurality of colors (Figure 3), said pixels generating an

original image data containing pixel data, each of which corresponds to one of said colors which are arranged in a predetermined distribution; A reading processor that reads said pixel data from said imaging device; Column 2, Lines 11-17. A thinning processor that thins out some of said pixel data to generate a thinned image data, colors of which are arranged in said predetermined distribution; Figure 3 and Column 3, Lines 57-60 and an interpolation processor that performs an interpolation process on said thinned image data to generate an interpolated image data for each of said colors; Column 4, Lines 12-20. Furthermore, the thinned pixel data displayed on the LCD display is uniformly distributed and spaced from each other because the thinned pixel data consists of the pixels continuing in the uniform pattern as depicted in Figure 3 of Miyamoto. It is viewed by the examiner that the thinned pixel data displayed on the LCD display are spaced from each other because the thinned pixel data consists of the pixels and are in a two-dimensional matrix. The pixels are in different geometric locations. Therefore, the pixels are spaced from each other by at least one thinned out pixel data. Miyamoto teaches a thinning technique which preserves the original color filter arrangement in the subsequent thinned image. However, Miyamoto selecting the pixels according to a sub-sampling corresponding to the depiction of Figure (3) and does not teach that the thinned pixel data can be selected so that each pixel in the thinned pixel data is separated from each other by at least one pixel data.

Kondo et al teaches on Column 5, Lines 40-55 and depicts in Figure 9a that it is advantageous when thinning an image to thin the image by selecting every third column and third line of image data (Column 12, Lines 47-61). Therefore, each thinned pixel selected in the thinning process of Kondo et al is separated from each other by at least one pixel data. Kondo et

al teaches in the abstract that this thinning process is advantageous because it performs the thinning process without deteriorating the coding efficiency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the thinning technique of selecting every third column and third line of image data as taught by Kondo et al in the digital camera of Miyamoto in order to perform the line thinning process without deteriorating the coding efficiency.

Miyamoto does not specifically teach an imaging device that has photo-diodes rather states that the imaging device is a CCD image sensor.

Tsang et al depicts in Figure 4 and teaches on Columns 4 and 5, Lines 60-67 and Lines 1-4 the use of an image sensor that uses photo-diodes for generating image data. Tsang et al teaches that it is advantageous to use photo-diodes because they provide superior quantum efficiency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the photo-diode image sensor array configuration of Tsang et al for the image sensor of Miyamoto in order to provide superior quantum efficiency.

Miyamoto teaches on Column 3, Lines 57-63 and depicts in Figure 3 wherein the colors of the original image data are arranged in such a manner that a (mxm) matrix, formed by the plurality of colors, is repeated, and the thinning processor thins out (mx(n-1)) number of pixel data for every (mxn) number of pixel data in a horizontal direction and a vertical direction of an image corresponding to the original image data, wherein each of "m" and "n" is a positive integer greater than 1. the examiner has viewed m=2 and n=2, therefore there is a (2x2) matrix which contains two green pixels one red pixel and one blue pixel. The system thins out 2 pixel

data for every 4-pixel data. Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2, and that by changing the number of pixels between neighboring pixel blocks, other corresponding ratios can be used. However, Miyamoto does not specifically state that the thinning processor thins out 2 pixel data for every 3 pixel data.

However, Hayashi teaches on Column 4, Lines 53-67 and depicts in Figure 1 the use of a system which collects image data from an image sensor and thins the image data using an appropriate thinning ratio so that the output image has the same resolution as the monitor (29) used for display. Hayashi further teaches that several image sensor resolutions and several monitor resolutions can be used. Hayashi teaches that it is advantageous to allow the thinning processor to use multiple thinning ratios so that several types of CCDs and monitors having different resolutions can be used in the same system and therefore, make both the CCD and the monitors interchangeable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable the system of Miyamoto to use a reduction ratio in which the thinning processor thins out 2 pixel data for every 3 and 4 pixels for every 5 pixels in order to enable the system to display the image data on a display screen that had one third the resolution or one fifth the resolution of the image sensor. Therefore, enabling the system to make both the CCD and the monitor interchangeable.

Miyamoto teaches the use of a system that interpolates pixels to generate a thinned image. Miyamoto teaches on Column 4, Lines 8-25 that the pixels are combined using a weighting function as defined on line 21. However, Miyamoto does not teach that the interpolation function can be calculated for each pixel based upon adjacent pixel data such that

the adjacent pixel data are each multiplied by a weight coefficient, the resulting values are summed, and the sum is divided by a number of the adjacent pixel data.

Judd depicts in Figure 1 and depicts on Column 3, Line 60-Column 4, Line 10 that it is advantageous when performing an interpolation process to calculated for each pixel based upon adjacent pixel data such that the adjacent pixel data are each multiplied by a weight coefficient, the resulting values are summed, and the sum is divided by a number of the adjacent pixel data in order to speed up the interpolation process. Judd teaches that the sum is divided by the sum of the weights of all the adjacent pixels. This value of the sum of the weights is viewed by the examiner as dividing by a number of the adjacent pixel data since the sum of the weights is a number corresponding to a number of the adjacent pixel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the interpolation equation as taught by Judd for the interpolation function of Miyamoto in order to speed up the interpolation process.

3: As for Claim 3, Miyamoto teaches on Column 3, lines 57-63 and depicts in Figure 3 wherein the colors of the original image data are arranged in such a manner that a (2x2) matrix, formed by said plurality of colors, is repeated, and said thinning processor thins out (2 x (n-1)) = 2 number of pixel data for every (2 x n) = 4 number of pixel data in a horizontal direction and a vertical direction of an image corresponding to the original image data. The examiner has viewed n = 2, therefore there is a (2x2) matrix which contains two green pixels one red pixel and one blue pixel. And the system thins out 2 pixel data for every 4 pixel data.

4: In regards to Claim 4, Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2, and that by changing the number of pixels between

neighboring pixel blocks, other corresponding ratios can be used. Miyamoto teaches on Column 3, Lines 57-63 and depicts in Figure 3 wherein the colors of the original image data are arranged in such a manner that a (mxm) matrix, formed by the plurality of colors, is repeated, and the thinning processor thins out (mx(n-1)) number of pixel data for every (mxn) number of pixel data in a horizontal direction and a vertical direction of an image corresponding to the original image data, wherein each of "m" and "n" is a positive integer greater than 1. The examiner has viewed m=2 and n=2, therefore, there is a (2x2) matrix which contains two green pixels one red pixel and one blue pixel. The system thins out 2 pixel data for every 4-pixel data. Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2 , and that by changing the number of pixels between neighboring pixel blocks, other corresponding ratios can be used. However, Miyamoto does not specifically state that the thinning processor thins out 2 pixel data for every 3 pixel data.

However, Hayashi teaches on Column 4, Lines 53-67 and depicts in Figure 1 the use of a system which collects image data from an image sensor and thins the image data using an appropriate thinning ratio so that the output image has the same resolution as the monitor (29) used for display. Hayashi further teaches that several image sensor resolutions and several monitor resolutions can be used. Hayashi teaches that it is advantageous to allow the thinning processor to use multiple thinning ratios so that several types of CCDs and monitors having different resolutions can be used in the same system and therefore, make both the CCD and the monitors interchangeable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable the system of Miyamoto to use a reduction ratio in which the

thinning processor thins out 2 pixel data for every 3 and 4 pixels for every 5 pixels in order to enable the system to display the image data on a display screen that had one third the resolution or one fifth the resolution of the image sensor. Therefore, enabling the system to make both the CCD and the monitor interchangeable.

5: As for Claim 5, Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2, and that by changing the number of pixels between neighboring pixel blocks, other corresponding ratios can be used.

Miyamoto teaches on Column 3, Lines 57-63 and depicts in Figure 3 wherein the colors of the original image data are arranged in such a manner that a (mxm) matrix, formed by the plurality of colors, is repeated, and the thinning processor thins out (mx(n-1)) number of pixel data for every (mxn) number of pixel data in a horizontal direction and a vertical direction of an image corresponding to the original image data, wherein each of "m" and "n" is a positive integer greater than 1. The examiner has viewed m=2 and n=2, therefore, there is a (2x2) matrix which contains two green pixels one red pixel and one blue pixel. The system thins out 2 pixel data for every 4-pixel data. Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2 , and that by changing the number of pixels between neighboring pixel blocks, other corresponding ratios can be used. However, Miyamoto does not specifically state that the thinning processor thins out 2 pixel data for every 3 pixel data.

However, Hayashi teaches on Column 4, Lines 53-67 and depicts in Figure 1 the use of a system which collects image data from an image sensor and thins the image data using an appropriate thinning ratio so that the output image has the same resolution as the monitor (29) used for display. Hayashi further teaches that several image sensor resolutions and several

monitor resolutions can be used. Hayashi teaches that it is advantageous to allow the thinning processor to use multiple thinning ratios so that several types of CCDs and monitors having different resolutions can be used in the same system and therefore, make both the CCD and the monitors interchangeable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable the system of Miyamoto to use a reduction ratio in which the thinning processor thins out 2 pixel data for every 3 and 4 pixels for every 5 pixels in order to enable the system to display the image data on a display screen that had one third the resolution or one fifth the resolution of the image sensor. Therefore, enabling the system to make both the CCD and the monitor interchangeable.

6: In regards to Claim 6, Miyamoto depicts in Figure 3 that the colors of the color filter elements are arranged in the Bayer arrangement.

7: As for Claim 7, Miyamoto depicts in Figure 3 that the color filter has red filter elements, green filter elements and blue filter elements, and in the (2 x 2) matrix, the green filter elements are positioned on a diagonal line, and the red filter element and the blue filter element are positioned on another diagonal line.

8: In regards to Claim 8, Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2, and that by changing the number of pixels between neighboring pixel blocks, other corresponding ratios can be used. Therefore, the reduction ratio is set in accordance with which the number of pixel data thinned out by the thinned processor.

9: As for Claim 9, Miyamoto teaches on Column 5, Lines 64-67 a reduced image indicating processor that forms a color image based on the interpolated image data and indicates the color

image. Miyamoto teaches that the reduced or thinned image is interpolated and sent to the video memory and is then displayed on an LCD. This is viewed by the examiner as forming a color image based on the interpolated image data and indicates the color image.

10: In regards to Claim 11, Miyamoto depicts in Figure 3 that the colors of the color filter elements are arranged in the Bayer arrangement.

11: As for Claim 12, Miyamoto depicts in Figure 3 that the color filter has red filter elements, green filter elements and blue filter elements, and in the (2 x 2) matrix, the green filter elements are positioned on a diagonal line, and the red filter element and the blue filter element are positioned on another diagonal line.

12: Claims 10 and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,593,965 Miyamoto in view of in view of USPN 5,912,708 Kondo et al in view of USPN 5,734,427 Hayashi et al in further view of USPN 4,779,135 Judd.

13: As for Claim 10, Miyamoto teaches an image reading device in which pixel data of a first image, formed on an imaging device having an on-chip color filter of a plurality of colors, are point-sequentially read from the imaging device (Column 2, Lines 11-17). And subjected to an interpolation process (Column 4, Lines 12-20) to generate components of the plurality of colors for each of the pixel data to obtain a second image, the image reading device comprising:

A thinning processor (Figure 3 and Column 3, Lines 57-60) that thins out some of the pixel data before the pixel data are subjected to the interpolation process, so that the second image is composed of a smaller number of pixels than the first image. Furthermore, the thinned pixel data displayed on the LCD display is uniformly distributed and spaced from each other because the thinned pixel data consists of the pixels continuing in the uniform pattern as depicted

in Figure 3 of Miyamoto. It is viewed by the examiner that the thinned pixel data displayed on the LCD display are spaced from each other because the thinned pixel data consists of the pixels and are in a two-dimensional matrix. The pixels are in different geometric locations. Therefore, the pixels are spaced from each other by at least one thinned out pixel data. Miyamoto teaches a thinning technique which preserves the original color filter arrangement in the subsequent thinned image. However, Miyamoto selecting the pixels according to a sub-sampling corresponding to the depiction of Figure (3) and does not teach that the thinned pixel data can be selected so that each pixel in the thinned pixel data is separated from each other by at least one pixel data.

Kondo et al teaches on Column 5, Lines 40-55 and depicts in Figure 9a that it is advantageous when thinning an image to thin the image by selecting every third column and third line of image data (Column 12, Lines 47-61). Therefore, each thinned pixel selected in the thinning process of Kondo et al is separated from each other by at least one pixel data. Kondo et al teaches in the abstract that this thinning process is advantageous because it performs the thinning process without deteriorating the coding efficiency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the thinning technique of selecting every third column and third line of image data as taught by Kondo et al in the digital camera of Miyamoto in order to perform the line thinning process without deteriorating the coding efficiency.

Miyamoto teaches on Column 3, Lines 57-63 and depicts in Figure 3 wherein the colors of the original image data are arranged in such a manner that a (mxm) matrix, formed by the plurality of colors, is repeated, and the thinning processor thins out (mx(n-1)) number of pixel

data for every (mxn) number of pixel data in a horizontal direction and a vertical direction of an image corresponding to the original image data, wherein each of "m" and "n" is a positive integer greater than 1. The examiner has viewed m=2 and n=2, therefore there is a (2x2) matrix which contains two green pixels one red pixel and one blue pixel. The system thins out 2 pixel data for every 4-pixel data. Miyamoto teaches on Column 5, Lines 59-63 that the ratio for image reduction is not limited to 1:2, and that by changing the number of pixels between neighboring pixel blocks, other corresponding ratios can be used. However, Miyamoto does not specifically state that the thinning processor thins out 2 pixel data for every 3 pixel data.

However, Hayashi teaches on Column 4, Lines 53-67 and depicts in Figure 1 the use of a system which collects image data from an image sensor and thins the image data using an appropriate thinning ratio so that the output image has the same resolution as the monitor (29) used for display. Hayashi further teaches that several image sensor resolutions and several monitor resolutions can be used. Hayashi teaches that it is advantageous to allow the thinning processor to use multiple thinning ratios so that several types of CCDs and monitors having different resolutions can be used in the same system and therefore, make both the CCD and the monitors interchangeable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable the system of Miyamoto to use a reduction ratio in which the thinning processor thins out 2 pixel data for every 3 and 4 pixels for every 5 pixels in order to enable the system to display the image data on a display screen that had one third the resolution or one fifth the resolution of the image sensor. Therefore, enabling the system to make both the CCD and the monitor interchangeable.

Miyamoto teaches the use of a system that interpolates pixels to generate a thinned image. Miyamoto teaches on Column 4, Lines 8-25 that the pixels are combined using a weighting function as defined on line 21. However, Miyamoto does not teach that the interpolation function can be calculated for each pixel based upon adjacent pixel data such that the adjacent pixel data are each multiplied by a weight coefficient, the resulting values are summed, and the sum is divided by a number of the adjacent pixel data.

Judd depicts in Figure 1 and depicts on Column 3, Line 60-Column 4, Line 10 that it is advantageous when performing an interpolation process to calculated for each pixel based upon adjacent pixel data such that the adjacent pixel data are each multiplied by a weight coefficient, the resulting values are summed, and the sum is divided by a number of the adjacent pixel data in order to speed up the interpolation process. Judd teaches that the sum is divided by the sum of the weights of all the adjacent pixels. This value of the sum of the weights is viewed by the examiner as dividing by a number of the adjacent pixel data since the sum of the weights is a number corresponding to a number of the adjacent pixel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the interpolation equation as taught by Judd for the interpolation function of Miyamoto in order to speed up the interpolation process.

14: In regards to Claim 13, Miyamoto teaches an image reading device comprising:

An imaging device that has pixels and color filters provided on said imaging device, said color filter having color filter elements of a plurality of colors (Figure 3), said pixels generating an original image data containing pixel data, each of which corresponds to one of said colors which are arranged in a predetermined distribution; A reading processor that reads said pixel data from

said imaging device; Column 2, Lines 11-17. A thinning processor that thins out some of said pixel data to generate a thinned image data, colors of which are arranged in said predetermined distribution; Figure 3 and Column 3, Lines 57-60 and an interpolation processor that performs an interpolation process on said thinned image data to generate an interpolated image data for each of said colors; Column 4, Lines 12-20. Furthermore, the thinned pixel data displayed on the LCD display is uniformly distributed and spaced from each other because the thinned pixel data consists of the pixels continuing in the uniform pattern as depicted in Figure 3 of Miyamoto. It is viewed by the examiner that the thinned pixel data displayed on the LCD display are spaced from each other because the thinned pixel data consists of the pixels and are in a two-dimensional matrix. The pixels are in different geometric locations. Therefore, the pixels are spaced from each other by at least one thinned out pixel data. Miyamoto teaches a thinning technique which preserves the original color filter arrangement in the subsequent thinned image. However, Miyamoto selecting the pixels according to a sub-sampling corresponding to the depiction of Figure (3) and does not teach that the thinned pixel data can be selected so that each pixel in the thinned pixel data is separated from each other by at least one pixel data.

Kondo et al teaches on Column 5, Lines 40-55 and depicts in Figure 9a that it is advantageous when thinning an image to thin the image by selecting every third column and third line of image data (Column 12, Lines 47-61). Therefore, each thinned pixel selected in the thinning process of Kondo et al is separated from each other by at least one pixel data. Kondo et al teaches in the abstract that this thinning process is advantageous because it performs the thinning process without deteriorating the coding efficiency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the thinning technique of selecting every third column and third line of image data as taught by Kondo et al in the digital camera of Miyamoto in order to perform the line thinning process without deteriorating the coding efficiency.

However, Hayashi teaches on Column 4, Lines 53-67 and depicts in Figure 1 the use of a system which collects image data from an image sensor and thins the image data using an appropriate thinning ratio so that the output image has the same resolution as the monitor (29) used for display. Hayashi further teaches that several image sensor resolutions and several monitor resolutions can be used. Hayashi teaches that it is advantageous to allow the thinning processor to use multiple thinning ratios so that several types of CCDs and monitors having different resolutions can be used in the same system and therefore, make both the CCD and the monitors interchangeable.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable the system of Miyamoto to use a reduction ratio in which the thinning processor thins out 2 pixel data for every 3 and 4 pixels for every 5 pixels in order to enable the system to display the image data on a display screen that had one third the resolution or one fifth the resolution of the image sensor. Therefore, enabling the system to make both the CCD and the monitor interchangeable.

Miyamoto teaches the use of a system that interpolates pixels to generate a thinned image. Miyamoto teaches on Column 4, Lines 8-25 that the pixels are combined using a weighting function as defined on line 21. However, Miyamoto does not teach that the interpolation function can be calculated for each pixel based upon adjacent pixel data such that

the adjacent pixel data are each multiplied by a weight coefficient, the resulting values are summed, and the sum is divided by a number of the adjacent pixel data.

Judd depicts in Figure 1 and depicts on Column 3, Line 60-Column 4, Line 10 that it is advantageous when performing an interpolation process to calculated for each pixel based upon adjacent pixel data such that the adjacent pixel data are each multiplied by a weight coefficient, the resulting values are summed, and the sum is divided by a number of the adjacent pixel data in order to speed up the interpolation process. Judd teaches that the sum is divided by the sum of the weights of all the adjacent pixels. This value of the sum of the weights is viewed by the examiner as dividing by a number of the adjacent pixel data since the sum of the weights is a number corresponding to a number of the adjacent pixel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the interpolation equation as taught by Judd for the interpolation function of Miyamoto in order to speed up the interpolation process.

15: In regards to Claim 14, Miyamoto depicts in Figure 3 that the colors of the color filter elements are arranged in the Bayer arrangement.

16: As for Claim 15, Miyamoto depicts in Figure 3 that the color filter gas red filter elements, green filter elements and blue filter elements.

17: As for Claim 16, Miyamoto depicts in Figure 3 that the color filter has red filter elements, green filter elements and blue filter elements, and in the (2 x 2) matrix, the green filter elements are positioned on a diagonal line, and the red filter element and the blue filter element are positioned on another diagonal line.

18: In regards to Claim 17, Miyamoto teaches a thinning processor (reduced image indicating processor)(Figure 3 and Column 3, Lines 57-60) that thins out some of the pixel data before the pixel data are subjected to the interpolation process, so that the second image (formed color image based on the interpolated image) is composed of a smaller number of pixels than the first image. Furthermore, the thinned pixel data displayed on the LCD display is uniformly distributed and spaced from each other because the thinned pixel data consists of the color pixels continuing in the uniform pattern as depicted in Figure 3 of Miyamoto.

19: As for Claim 18, Miyamoto teaches an image reading device in an on-chip color filter of a plurality of colors, are point-sequentially read from the imaging device (Column 2, Lines 11-17).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Hannett whose telephone number is 571-272-7309. The examiner can normally be reached on 8:00 am to 5:00 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivek Srivastava can be reached on 571-272-7304. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James M. Hannett
Examiner
Art Unit 2622

JMH
December 4, 2006